RESEARCH REPORT

A multi-site comparison of psychosocial approaches for the treatment of methamphetamine dependence

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ABSTRACT

Aims The Center for Substance Abuse Treatment (CSAT) Methamphetamine Treatment Project (MTP) is the largest randomized clinical trial of treatments for methamphetamine (MA) dependence to date. The objective of the study was to compare the Matrix Model, a manualized treatment method, with treatment-as-usual (TAU) in eight community out-patient settings in the Western United States.

Design Over an 18-month period between 1999 and 2001, 978 treatment-seeking, MA-dependent people were randomly assigned to receive either TAU at each site or a manualized 16-week treatment (Matrix Model).

Setting The study was conducted as an eight-site out-patient trial, with six sites located in California and one each in Montana and Hawaii.

Findings In the overall sample, and in the majority of sites, those who were assigned to Matrix treatment attended more clinical sessions, stayed in treatment longer, provided more MA-free urine samples during the treatment period and had longer periods of MA abstinence than those assigned to receive TAU. Measures of drug use and functioning collected at treatment discharge and 6 months post-admission indicate significant improvement by participants in all sites and conditions when compared to baseline levels, but the superiority of the Matrix approach did not persist at these two timepoints.

Conclusions Study results demonstrate a significant initial step in documenting the efficacy of the Matrix approach. Although the superiority of the Matrix approach over TAU was not maintained at the post-treatment timepoints, the in-treatment benefit is an important demonstration of empirical support for this psychosocial treatment approach.

KEYWORDS Clinical trial, cognitive-behavioral treatment, methamphetamine addiction.

INTRODUCTION

Methamphetamine (MA) use is a significant and growing problem in the United States [1–3]. The use of MA has increased to epidemic proportions and has become the dominant drug problem in the Western and Midwestern portions of the country, most severely impacting rural areas and moderate-sized urban communities [4–6]. In spite of the growing epidemic, no consistently effective pharmacological treatment has been developed to treat the disorder [7]. Psychosocial and behavioral approaches constitute the primary treatments available for MA-dependent individuals. However, even in the arena of psychosocial treatments, little research has been conducted to pinpoint an effective treatment or distinguish between what actually works and what is delivered by default simply because it is part of 'standard community treatment'.

One promising psychosocial treatment model for MA dependence has been tested in open trials. The Matrix Model, a manualized out-patient approach for treating stimulant disorders, has been assessed in several large groups of MA-dependent individuals. Outcomes demonstrated that, in general, the treatment response of MA-dependent individuals was positive [2,8]. Additional support for the Matrix approach has been reported in treatment trials with cocaine-dependent individuals [9,10] and in a controlled trial of the cognitive behavioral therapy group component of the Matrix approach [11].

The Matrix Model combines techniques and materials from the cognitive behavioral therapy literature to include accurate information on the effects of stimulants, family education, 12-Step program participation and positive reinforcement for behavior change and treatment compliance [12]. The 16-week intensive treatment protocol is delineated in a detailed treatment manual; the content and rationale of the protocol have been described in detail in previous publications [11,13].

Although the empirical evidence cited above was uncontrolled and descriptive, the promise of the Matrix Model for the treatment of MA dependence (and the lack of any empirical evidence for any other methods) resulted in a Center for Substance Abuse Treatment (CSAT)-sponsored announcement to conduct a multi-site study to replicate and evaluate the Matrix Model with an MA-dependent sample. The resulting Methamphetamine Treatment Project (MTP) is the largest randomized clinical trial of psychosocial treatments for MA dependence to date [14]. The project was funded through the Substance Abuse and Mental Health Services Administration's (SAMHSA) CSAT as a cooperative agreement providing funding to seven investigative teams at eight treatment sites and to one coordinating center that was charged with designing, administering and executing the study. The MTP compares treatment outcomes in participants randomly assigned to receive either the manualized Matrix Model of MA treatment or treatment-as-usual (TAU) at each of the sites.

STUDY DESIGN

Sites

In addition to the Coordinating Center at UCLA, seven investigative teams conducted the study at eight sites in Northern and Southern California, Hawaii and Montana. Each site was expected to recruit 150 participants into the study. In each site, half were randomly assigned to receive the Matrix Model of treatment, whereas the other half of the participants received TAU as delivered at that site. Considerable program heterogeneity was documented across the eight sites. One site treated women clients exclusively, a drug court provided the context for one site and two sites treated significant proportions of Asians and Pacific Islanders. The remaining sites provided care primarily to Caucasian and Hispanic urban, suburban and rural residents.

Treatment-as-usual (TAU)

Specific and detailed information describing the theoretical foundation, setting, duration and intensity, services offered and clinician qualifications for the eight TAUs has been previously published [1]. All treatment sites employed out-patient treatment models, with the intensive phase of treatment ranging from 4 to 16 weeks across sites. Participants were expected to have contact with their treatment program from 1 to 13 hours per week. All aspects of TAU varied widely across sites. In addition to the services delivered during the active treatment period, participants in both conditions at all sites were encouraged to participate in continuing care activities following the completion of the designated treatment dose. Elements of TAU at these sites are summarized in Table 1.

No attempt was made to standardize or monitor the fidelity of the TAU conditions, as it was the intent of the project to compare the Matrix approach to the treatments delivered routinely by the program staff. All TAU clinical staff were supervised by each program's clinical director and were not involved in any aspect of training, supervision or service delivery of the Matrix condition. It should be noted that as 'comparison conditions', these TAU conditions represented a 'best available option' and not a 'minimal contact comparison' condition. A recent report on the effectiveness of standard substance abuse treatment demonstrated that a community-based approach was shown to produce superior outcomes to a minimal treatment control [15]. Therefore, this design comparing the Matrix Model to eight other 'real-world' service configurations represents an adequate test of the model.

Table I Treatment-as-usual: elements of treatment.

Site	Duration of treatment (intensive phase)	Individual sessions	Group sessions	12-Step program involvement
Site 1	8 weeks	1×/ week × 4–8 weeks, 30–50 minutes each	4×/ week × 4–8 weeks, 3 hours each; families attend 1×/ week	Required; 1×/ week × 4–8 weeks
Site 2	12 weeks	1×/ week × 12 week, 1 hour each	5×/ week × 2 weeks, 3×/ week × 2 weeks, 2×/ week × 8 weeks	Recommended
Site 3	12 weeks	1×/ week × 12 weeks, 1 hour each	None	Recommended
Site 4	16 weeks	1×/ week × 16 weeks, 10–15 minutes each	3×/ week × 16 weeks, 1 hour each	Required; 3×/ week × 16 weeks
Site 5	12 weeks	1×/ week × 12 weeks, 30–60 minutes each	3×/ week × 12 weeks, 90 minutes each and 2×/ week × 12 weeks, 60–90 minutes each	Required; 1×/ week × 12 weeks
Site 6	12 weeks	1×/ week–2×/months × 12 weeks, 1 hour each	2×/ week × 12 weeks, 90 minutes each; families attend 1×/2 weeks	Recommended
Site 7	16 weeks	1×/ week × 16 weeks, 1 hour each	2×/ week × 16 weeks, 2 hours each	Recommended
Site 8	12 weeks	2×/ week × 12 weeks, 1 hour each	1×/ week × 12 weeks, 2 hours each	Required; 6 meetings

The Matrix Model

The Matrix Model of out-patient stimulant abuse treatment was developed originally using data from cocaine-abusing participants in treatment at Matrix Institute offices in the Los Angeles metropolitan area during the 1980s. The multi-component treatment approach was constructed using empirically supported interventions and treatment elements, and guided by an iterative process of pilot-testing diverse strategies and incorporating those that enhanced treatment attendance and decreased drug use as measured objectively by urinalysis. The resulting package of treatment elements has been organized into a manualized treatment protocol consisting of 16 weeks of cognitive behavioral therapy groups (36 sessions), family education groups (12 sessions), social support groups (four sessions) and individual counseling (four sessions), combined with weekly breath alcohol testing and urine testing for cocaine, methamphetamine, opiates, cannabis and benzodiazepines. Weekly or more frequent attendance at 12-Step meetings was also encouraged. All treatment sessions are delivered using a non-judgemental, non-confrontational style and employ extensive positive reinforcement by therapists and peers for behavior change.

In this study, staff trained to deliver the Matrix Model received an initial 40 hours of didactic and experiential training. Clinical supervisors, under the direction of the clinical director from the coordinating center, conducted booster training sessions at each site, led mandatory weekly teleconferences with site Matrix clinicians, monitored clinician performance via a weekly activity checklist, reviewed a sample of tape-recorded sessions and provided feedback regularly to ensure that the Matrix Model was implemented as designed.

Based on the Psychiatric Rehabilitation Fidelity Toolkit [16], two fidelity scales were developed to assess adherence to the treatment protocol. Data from year 2 of the study found that sites adhered to the Matrix Model protocol in implementation of critical elements. The average score of fidelity for structural elements was 4.15 (model mostly implemented). The category with the highest average was 'utilization of manual', at 4.88 (fully implemented), and the lowest was the 'group characteristics' category, at 3.02 (model satisfactorily implemented). The average percentage of fidelity to therapist–client interaction elements for all sites was 82.39%.

METHOD

Research design

All sites obtained all appropriate clearances and approvals from the relevant Institutional Review Boards (IRBs) and agencies prior to study commencement. All poten-

tial candidates for the study participated in informed consent procedures as required by the local IRBs. The coordinating center operated under the approval of the UCLA IRB.

Research assistants from all sites were trained and certified for proficiency in research practices, standard operating procedures, data collection protocol mastery and instrument administration. Continuing oversight was maintained through regularly scheduled mandatory teleconferences and periodic site visits by the coordinating center staff for inspection of data collection and research procedures. Full details of the research procedures have been previously published [17].

Participants

Participant inclusion and exclusion criteria were as follows. To be included, candidates had to be: at least 18 years of age of either gender; MA-dependent as determined by the DSM-IV checklist; willing to complete forms and provide urine samples; able to understand scales and instructions; able to understand and provide informed consent; able to understand English; and able to participate in all aspects of either treatment condition. Exclusion criteria included: having a medical and/or psychiatric impairment precluding safe participation; requiring medical detoxification from opioids/alcohol/other drugs; not having used MA in past 30 days (unless the patient had been in a controlled environment, such as jail or prison); having been enrolled in another treatment program in the past 30 days; and having medical, legal, housing or transportation issues precluding safe and/or consistent participation.

Almost half the recruited participants were male (45%), 60% were Caucasian, 18% Hispanic and 17% Asian/Pacific Islander. Other participant characteristics at baseline included: age: 32.8 years on average; education: 12.2 years on average; employment: 69%; and married and not separated: 16%. Participants were recruited through a variety of means, including media advertisements, referrals from community agencies (medical, substance abuse, mental health and criminal justice) and word of mouth. Although the inclusion and exclusion criteria for the study may have precluded participation by the most severely disabled individuals, the characteristics of the participating cohort were consistent with clinical treatment samples studied previously [2,8]. Multiple substances of abuse were documented in participants' drug-use histories, but both self-reports and urinalyses confirmed that there was practically no use of substances other than MA, marijuana and alcohol throughout the duration of the study. The participants had on average 7.54 years of life-time MA use and 11.53 days of MA use in the past 30 days. The preferred route of administration of MA was smoking (65%), followed by i.v.-injecting (24%) and snorting (11%).

Written informed consent was obtained from each participant after the study procedure had been fully described. After providing consent, participants completed an admission form and an inclusion/exclusion criteria verification, as well as a baseline battery of assessments including the DSM-IV MA-dependence checklist, the Addiction Severity Index (ASI; fifth edition) [18] and others, the results of which are not presented in this paper. Instruments were repeated periodically during the active treatment phase, at discharge and 6 months and 12 months post-admission. Objective assessment of substance use was obtained by urine samples collected once weekly from participants in both treatment conditions at all sites. Samples were analyzed for methamphetamine, amphetamines, cocaine, opiates and marijuana at a central, off-site contract laboratory.

Attendance data

Before examining the treatment outcomes, it is necessary to determine whether study conditions differed in the amounts of treatment received. The eight TAU conditions provided diverse combinations of services and prescribed different levels and types of attendance at clinical appointments each week (see Table 1). The sites did record the number of clinical sessions attended by participants and these data can be aggregated to reflect the total number of clinical contacts for each participant. The overall mean number of clinical contacts made by participants assigned to TAU was about 13 (SD = ± 15). For the Matrix participants overall, the mean number of clinical contacts was approximately 27 (SD = ± 20). A detailed summary of the number of clinical contacts by treatment condition and site is presented in Table 2. Although variability in the amount of Matrix treatment delivered to participants across sites is evident, these data indicate that participants at all sites received substantial doses of the Matrix treatment.

Follow-up rates

Overall, 798 of 978 participants (81.6%) completed discharge interviews, and 841 of 978 participants (86%) completed 6-month follow-up interviews. (At the time of this manuscript preparation, the 12-month data collection/analysis was incomplete.) There was no difference in follow-up rate by treatment condition.

Design and analytical issues

Analysis of the MTP data posed several challenges because the study's design differed from that of tradi-

Table 2 Summary of the number of clinical contacts made by participants, by treatment site and condition.

Site (TAU length, weeks)	Matrix		TAU	
	Mean	SD	Mean	SD
Site 1 (8)	25.2	17.9	17.2	14.0
Site 2 (12)	26.1	17.3	21.7	15.7
Site 3 (12)	28.4	18.2	6.3	3.6
Site 4 (16)	31.5	20.0	22.8	15.4
Site 5 (12)	25.7	20.0	15.4	19.8
Site 6 (12)	25.2	24.7	2.1	3.1
Site 7 (16)	35.4	19.1	13.8	14.5
Site 8 (12)	22.2	18.6	3.9	5.0
Overall summary	26.8	19.7	12.7	14.7

Table 3 Comparison of retention between conditions within sites, with Matrix truncated to the length of TAU at each site.

Site	TAU length (weeks)	Log-rank	χ^2	P
Site 1	8	−20.07	33.17	<0.0001
Site 2	12	−9.49	4.98	0.026
Site 3	12	−8.39	3.68	0.055
Site 4	16	1.64	0.26	0.610
Site 5	12	−22.30	28.74	<0.0001
Site 6	12	−17.46	17.87	<0.0001
Site 7	16	−5.01	3.34	0.067
Site 8	12	−10.59	7.99	0.005

tional multi-site studies. All sites in the MTP implemented the Matrix treatment model as one arm of the study (condition A). The other treatment condition, TAU, was site-specific and varied widely between sites (conditions B1–B8). Thus, the broadest and most critical issue was the conceptual design of the statistical comparisons used to analyze the primary outcomes. Variation in program length provided another major analytical hurdle in this study. The main study outcomes were based on weekly measures (e.g. attendance, MA-free urine samples), but the length of TAU and Matrix protocols differed at most sites. As such, the number of chances participants had to provide evidence of satisfactory performance differed accordingly.

Analytical approach to comparisons between conditions

Due to the complexities of this study, several comparison methods were used to evaluate the primary outcomes. First, summaries of raw data reflecting the outcomes were presented prior to any manipulation of that data in an attempt to analytically 'equalize' Matrix and TAU conditions. Next, comparisons were presented in which Matrix participants' data were truncated to reflect only the data collected during the number of weeks that data were collected in the TAU condition at the same site. Finally, logistic regression models were employed to elucidate the Matrix–TAU differences.

Statistical methodology

Statistical methods applied to this data adhere to clinical trial standards. All tests are two-tailed. For all tests, alpha was set at the conventional level of 0.05. Results of statistical tests are provided for the comparisons of the truncated data and the data that resulted from combining the programs by treatment length, and for repeated-measures analyses of substance use across multiple time-

points. Due to the complex nature of this project, all results presented here have been confirmed by at least two statisticians working independently at the coordinating center.

For the logistic regression models presented, binomial and multinomial logistic regression analyses were run using SAS v. 8.2 software [19]. Outcome (dependent) measures included retention, program completion, and abstinence during the active treatment period. Treatment retention was operationalized as an ordinal variable with five categories in an approximate uniform distribution. A score of 5 indicates the longest retention, and 1 the shortest. Treatment completion was operationalized as a binary variable, with 1 indicating completed treatment and 0 indicating treatment not completed. Abstinence from drug use was operationalized as an ordinal variable having three categories: category 1 represents those clients who had 50–100% MA-free urine results (30%); category 2 represents those clients who had less than 50% of MA-free urine results, but more than zero (32%); and category 3 represents clients with 0% MA-free urine results (38%). The analysis focused on predicting a trend of the probability of providing MA-free urine samples.

RESULTS

Retention and treatment completion data

Retention rates through treatment

Matrix participants were retained at a higher level than were TAU participants, except at site 4, the drug-court site. Five of the eight comparisons are statistically significant and indicate increased retention in the Matrix condition (see Table 3). Comparisons at sites 3 and 7 achieve marginal statistical significance, with the Matrix condition exhibiting increased retention relative to the TAU condition.

Table 4 Summary of the number of MA-free urine samples provided by participants, by treatment site and condition.

Site (TAU length, weeks)	Raw data				Truncated data					
	Matrix		TAU		Matrix		TAU			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	t	P
Site 1 (8)	6.23	5.41	3.38	2.95	3.75	2.91	3.38	2.95	−0.76	0.45
Site 2 (12)	6.25	5.94	4.19	4.24	4.86	4.59	4.19	4.24	−0.94	0.35
Site 3 (12)	5.75	5.51	3.62	3.67	4.61	4.28	3.62	3.67	−1.52	0.13
Site 4 (16)	8.44	6.28	8.6	6.18	8.44	6.28	8.6	6.18	0.13	0.89
Site 5 (12)	5.19	5.90	1.72	2.88	4.30	4.65	1.72	2.88	−3.70	0.0003
Site 6 (12)	4.24	5.36	3.27	4.12	3.3	4.19	3.27	4.12	−0.04	0.97
Site 7 (16)	7.0	5.93	4.54	5.22	7.0	5.93	4.54	5.22	−1.50	0.14
Site 8 (12)	5.39	5.65	3.30	4.05	4.28	4.23	3.30	4.05	−1.23	0.22

The results of multivariate modeling indicate that Matrix participants, compared to TAU participants, were 38% more likely to stay in treatment (odds ratio = 1.384). This analysis controls for treatment length by equalizing measures of treatment retention between the two conditions, ensuring that the significant effect was due to the treatment process, rather than the generally longer length of the Matrix treatment (16 weeks) as compared with the various lengths of the TAU condition (8, 12 or 16 weeks).

Treatment completion rates

Another way to compare participation in treatment is to examine the percentage of participants who completed the prescribed treatment program. For the purposes of this analysis, completion of the program is defined as the participant having attended at least one treatment session in his/her last scheduled week of treatment. This definition of completion has the advantage of being a simple and concrete endpoint for which all data from the study can be combined and analyzed with the full, intended statistical power. A simple χ^2 comparison across all sites indicates that the completion rate was 40.9% for Matrix participants and 34.2% for TAU participants. This difference is statistically significant ($\chi^2 = 4.68$; $P = 0.031$)

Controlling for the potential effects of demographics and the frequency and route of MA use, the multivariate logistic regression reveals that Matrix participants were 27% more likely to complete treatment (odds ratio = 1.269) than TAU participants. Additional analysis indicates that TAU participants at three sites were 85%, 74% and 54% less likely to complete treatment. No difference in treatment completion was found between the two conditions at four sites. As with the retention data, however, an exception to this trend was documented at the site operating in a drug-court context. The

TAU participants at this site were 2.17 times more likely to complete treatment than Matrix participants at this site. When program completion data from the drug-court site were not included in the overall analysis, Matrix participants were 38% more likely to complete treatment than TAU participants.

**Drug use during treatment, by site assessed by urinalyses**

Because participants were required to provide one urine sample each week, regardless of their treatment assignment, one way to look at these data is to calculate the mean number of MA-free samples collected from participants in each condition during the treatment period. The criterion that defined a MA-free sample required that the participant go to the treatment program to provide a urine sample that tested clean for drug metabolites. Therefore, the total number of MA-free samples is a measure that incorporates the influence of retention together with objective drug-use status. Table 4 presents the mean number of MA-free samples during the treatment period by site and condition.

The raw data indicate that at all sites except site 4 (the drug-court context), Matrix participants provided more clean urine samples than did TAU participants.

When the urine data are truncated (i.e. when data from the Matrix participants are included only for the number of weeks equal to the length of TAU at each site), the trend supporting higher rates of clean urines in the Matrix condition is sustained. However, the differences between the conditions are generally not statistically significant in these smaller comparisons, as illustrated in Table 4. The one exception to this is at site 5, where Matrix participants provided an average of 4.3 MA-free urine samples compared to 1.7 for TAU participants. In six of the remaining sites (all but site 4) Matrix participants provided, on average, one additional MA-free

Table 5 Longest MA abstinent period by treatment site and condition.

Site (TAU length, weeks)	Raw data				Truncated data					
	Matrix		TAU		Matrix		TAU			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	t	P
Site 1 (8)	3.575	4.600	2.754	3.183	2.877	3.109	2.754	3.183	−0.982	0.328
Site 2 (12)	3.753	5.105	2.474	3.306	3.377	4.271	2.474	3.306	−1.47	0.144
Site 3 (12)	3.197	4.484	1.805	2.763	3.013	4.028	1.805	2.763	−2.16	0.033
Site 4 (16)	6.140	5.771	5.560	5.218	6.140	5.771	5.560	5.218	−0.546	0.586
Site 5 (12)	3.889	5.439	1.279	2.274	3.429	4.467	1.279	2.274	−3.393	0.001
Site 6 (12)	2.429	3.843	2.342	3.671	2.314	3.491	2.342	3.671	0.2	0.841
Site 7 (16)	4.682	5.056	2.542	3.978	4.682	5.056	2.542	3.978	−1.586	0.121
Site 8 (12)	2.833	4.705	2.130	3.448	2.519	3.879	2.130	3.448	−0.551	0.583

* Statistitically signiticant two-group t-test, $P < 0.05$.
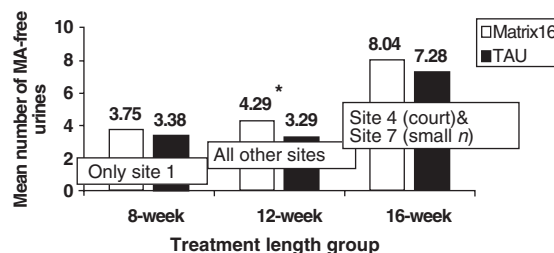
Figure 1 Mean number of MA-free urine samples, by treatment length and treatment condition (Matrix treatment length truncated to the length of TAU treatment)

urine sample than did those assigned to TAU (4.6 versus 3.7).

Results of urinalysis data can be aggregated by treatment length and compared. Figure 1 summarizes the data in this way. Although those assigned to the Matrix condition provided a greater number of MA-free urine samples than those assigned to the TAU condition in both the 8-week and 16-week treatments, the comparisons are not statistically significant. However, compared to TAU participants in the five programs that received 12 weeks of treatment, Matrix participants in those sites provided significantly more MA-free urines in the first 12 weeks of their treatment (4.3 and 3.3).

After controlling for the potential effects of demographics and the frequency and route of MA use, the multivariate logistic regression indicates that Matrix participants, compared to TAU participants, were 31% more likely to have MA-free urine test results (odds ratio = 1.311). The equalized measure of urine test results ensures that the significant effect was due to the treatment condition rather than differences in treatment length.

Weeks of consecutive abstinence documented by urinalysis

Another way to address the urinalysis data is to calculate the longest period of consecutive MA abstinence by each participant by condition and compare the conditions across sites, for rates of abstinence as documented by urinalysis. Table 5 presents the mean durations of the longest MA-abstinent period by site and condition. As illustrated in this table, the Matrix condition is associated with longer mean periods of abstinence than the TAU condition. This finding remains regardless of whether the raw mean totals or the truncated mean totals are computed. The Matrix condition had statistically significantly longer periods of consecutive abstinence in two of the eight comparisons (sites 3 and 5) using the truncated means.

Results from data collected at discharge and 6-month follow-up

Self-report of MA use from baseline to discharge and 6-month follow-up

Overall MA use by study participants was substantially reduced during treatment. Using data from the ASI, the self-reported number of days of MA use in the past 30 days was reduced from approximately 11 days at baseline to slightly over 4 days at discharge, and this reduction was maintained through the 6-month follow-up timepoint. Figure 2 shows the reduction in MA use by treatment condition and time. The magnitude of the reduction from baseline was consistent across sites and conditions. Repeated-measures analysis of variance results confirm that the effect of time was significant in the reduction in days of MA use ($F_{time} = 124.43$, $P < 0.0001$); however, no statistically significant differences by treatment condition were documented,
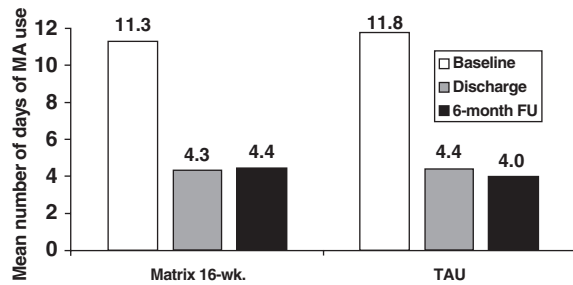
Figure 2 Participant self-report of MA use (number of days of use during the past 30 days) at enrollment, discharge and 6-month follow-up, by treatment condition

nor was there a significant interaction effect of condition × time.

Changes in ASI domains from baseline to discharge to follow-up

Except for the medical scale, all ASI domains demonstrated significant improvement (reduction in the composite score) across the treatment period. At 6-month follow-up, significant reductions from baseline were achieved for the drug, alcohol, psychiatric and family domains. Analyses of these data indicate a significant effect for time. Overall and within each site, however, there were no treatment condition effects or time–condition interactions.

Urinalysis results at discharge and follow-up

The percentages of the urine samples that were MA-free at the discharge interview were 66% for Matrix and 69% for TAU. At the 6-month follow-up, both conditions had 69% MA-free urine samples. Missing samples, which were equivalent across conditions, are not included. There were no overall significant differences in these urinalysis outcomes across conditions, nor were any of the individual site rates significantly different across conditions.

DISCUSSION

This study was a large-scale, multi-site undertaking to contribute to the knowledge about MA treatment. The study was designed to compare a multi-component, manualized psychosocial treatment approach (the Matrix Model) with a variety of psychosocial treatments currently in use in several community settings. Because the study was funded by SAMHSA to be conducted in 'real-world' treatment programs, using the diverse collection of treatment approaches in existence in these community

treatment settings, the study was not a conventional multi-site study comparing identical treatment approaches at all sites [20]. The comparison of the Matrix approach to eight different types of TAU increases within-group variance, thereby increasing the difficulty of achieving statistically significant findings. Conversely, by comparing the Matrix approach to a variety of TAU approaches, increased knowledge about potential differences may be statistically detected. Because these treatment approaches represent 'real-world' service configurations delivered by the organizations that developed them, rather than the 'minimal service comparison' employed in many clinical trials, the Matrix–TAU comparisons represent a relatively good comparison condition.

Participant performance during treatment period

Treatment attendance data suggest that it is very possible to deliver a substantial dose of psychosocial treatment to a diverse group of MA-dependent individuals. Across all eight sites, the mean number of sessions delivered to Matrix condition participants ranged from 22 to 35 of a maximum possible of 48. This across-site consistency of service delivery, as well as the data from the fidelity measurement procedures, reinforces the contention that there was appropriate consistency in the delivery of the Matrix approach.

Retention of participants in treatment has been shown to be an important correlate of successful outcome [21,22]. Because the Matrix approach was designed to be longer than six of the eight TAU conditions, the fact that the Matrix approach resulted in longer absolute retention in treatment is not surprising. However, the Matrix approach showed significantly better retention in treatment than the TAU condition even when program length was controlled, except in the one site in which the TAU condition was conducted within a drug-court context. To the extent that retention in out-patient treatment is viewed as a key indicator of treatment efficacy, the Matrix approach appears to be superior to the other treatments (except in the drug-court locale).

Use of MA during treatment is another key dependent measure of the efficacy of treatment. Participants in the Matrix condition provided more MA-negative urine samples during the treatment period across all but the drug-court site. This is not surprising, as the Matrix approach is longer than six of the seven non-drug-court sites, providing more opportunities to give a clean sample. However, even when the length of the Matrix approach is truncated to the prescribed length of the TAU conditions, participants in the Matrix condition provided significantly more MA-negative samples in the five 12-week programs than those in comparable TAU conditions.

Participant performance at discharge and follow-up

Certainly, measures of MA use and other areas of functioning at treatment discharge and at a 6-month point following admission are of great importance in assessing treatment efficacy. The essential finding regarding treatment for MA dependence is that at the discharge and 6-month follow-up data collection points, participants in both conditions demonstrated nearly a threefold reduction in mean days of MA use from baseline (self-reported days of MA use in the past 30 days), and a rate of 66–69% MA-negative urine samples at discharge and follow-up. More general measures of functioning at discharge indicate significant improvements in six of the seven domains of the ASI. (The medical scale did not show significant change.) At the 6-month follow-up, four of the seven ASI domains showed sustained improvements across all sites. Statistical analyses of all discharge and 6-month follow-up data indicated that the in-treatment superiority of the Matrix approach was not demonstrated at post-treatment measurement points.

Interpretation of study findings

The Matrix approach produces consistently better treatment retention and program completion than the TAU condition in overall analyses, and delivers more treatment 'events' than TAU at most sites. The Matrix approach also appears to result in more MA-free urine samples and longer periods of in-treatment abstinence than most TAU conditions during the active treatment period. The in-treatment superiority of the Matrix approach, however, is not reflected by measures of functioning collected at discharge or follow-up. These findings document that the use of the standard, accepted, dependent measures and statistical methods for measuring the efficacy of substance abuse treatment approaches can create less than uniform conclusions.

Is this demonstration that the Matrix treatment approach produces better in-treatment performance, but not superior outcome at discharge or follow-up, a meaningful advance in the knowledge about MA treatment? It could be argued that the only meaningful measure in a treatment comparison is the relative outcomes at study end and at follow-up points. The in-treatment differences are interesting, but not important as the superiority of the Matrix approach is not detected at discharge or follow-up. From this perspective, the results of this study add to a number of large multi-site trials in the substance abuse treatment literature that show that all treatment conditions are associated with comparable levels of improvement.

If the results of this study are viewed from the perspective that permanent behavioral changes are hard to maintain in many chronic illnesses, then the study data mark an advancement in the knowledge about treating MA users. First, the project recruited and treated almost 1000 MA-dependent individuals who were, on average, using MA more than one-third of the days in the month before admission. At study discharge, the number of days of use per month had been reduced to about 4 of 30 days, and this reduction in MA use persisted until the 6-month post-admission point for both TAU and Matrix participants. Secondly, the use of the Matrix manualized treatment protocol resulted in the achievement of multiple in-treatment goals to a statistically greater degree than did the TAU protocols, except in the drug-court program. Apparently, the drug-court intervention eliminated the difference between the Matrix and TAU conditions in this context.

The finding that the use of this manualized approach, employing many of the principles contained in the cognitive behavioral and motivational interviewing literature, produces better in-treatment performance than various community treatment protocols should not be unexpected. These specific therapies have solid evidence of efficacy in the treatment of cocaine users. The fact that the Matrix approach, which combines multiple components of these techniques into an intensive, structured protocol, produces significantly improved in-treatment performance is a significant advancement and is consistent with the increasing body of literature supporting these approaches.

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